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## From carbon footprint to transition plan in a French geosciences laboratory

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As people from a research lab, we are committed to participate in limiting the increase of Earth's average temperature and try to resolve this dilemma: how can we carry on producing knowledge and ideas in a world of limited resources. We are aware of the need for an environmental transition that would be achieved for our professional aspect/life by a profound evolution of our research practices (ie: French CNRS ethics committee: "integrating environmental issues into research practices\_ an ethical responsibility", opinion n° 2022-43).

The Sustainable Development & Social Responsibility working group of the research laboratory "Géosciences Rennes" was created in 2021 to (i) estimate the annual C footprint by using GES1.5 (Research Consortium Laboratory 1.5) protocol, (ii) propose awareness-raising and training initiatives and communicate, (iii) propose actions to reduce our environmental impacts. Based on the GES1.5 toolkit, we have determined our environmental impact from 2019 to 2022 through the calculation of the C footprints of 3 main domains: purchases, scientific missions and operation of the premises whose respective C footprint are 879, 520 and 708 and 775 T CO<sub>2</sub>eq, corresponding to 5.8, 3.6, 5.1 and 5.1 T CO<sub>2</sub>eq/person. The purchase of goods and services is the main item, representing  $48 \pm 7$  % (mean  $\pm$  SD) of the total C footprint over the 4 years. Scientific missions represent  $16 \pm 8$  %. Sanitary restrictions induced a drastic decrease of this C footprint in 2020 and 2021, but it has resumed and increased since.

These data were the corner stone of collaborative workshops (participatory workshops, surveys, suggestion boxes...) to invent our low-carbon laboratory and to vote a transition plan based on specific actions to collectively reduce the C footprint. The propositions do not intend to limit freedom to carry out research, but at transforming the way we do research to adapt to environmental constraints our societies are facing. 36 propositions were submitted to vote in autumn 2023 and 89% of the staff (about 150 persons) expressed an opinion. 26 propositions received more than 50% of "yes", and will therefore be gradually implemented over 6 years (2024-2030) as the reduction targets are set for 2030 (ambition: -45% compared with 2019). The trajectory and relevancy of the adopted propositions will be re-evaluated annually by calculating the laboratory's C footprint.

Our experience shows that appropriation of the issues takes time, which we no longer have. It emphasizes the need to go further than awareness measures. In addition, working at the lab level results in an average that conceals the considerable heterogeneity in terms of staff status,

thematic profiles and methods used (observation/experimentation/ modelling). Such heterogeneity generates a plurality of situations and it is uneasy to define just only strategy. More precise C footprints need to be defined, potentially on a one by one discipline basis, in order to identify avenues of research that will enable these disciplines to adapt to the conditions of a post-transition society.